

REMARKS

The foregoing amendments are made to more thoroughly define the subject matter applicant regards as his invention.

In this regard, claim 1 (and most of the other independent claims) have been amended to indicate that the curing agent used in the inventive foamable polymer system is a waterborne epoxy adduct of a polyamine, a polyamide or a polyamide-amine, as specified in Paragraph [0025] of the specification, especially in lines 4, 6, 10 and 16 of this paragraph, as well as original claims 7 and 8. New claims 65-67 have been added to claim these curing agents individually, while new claims 68 and 69 have been added to claim the two specific curing systems described at lines 17-19 of Paragraph [0025] and lines 19-21 of Paragraph [0025], respectively. Finally, new claim 70 has been added to claim the specific sulfonyl hydrazide blowing agents described in Paragraph [0027] of the specification.

The Invention

Sulfonyl hydrazides such as described in Paragraph [0027] of the specification and now recited in new claim 70 are a well-known class of **heat-activated** blowing agents that have been widely used for making different polymer foams, especially epoxy polymer foams. Each is known to have its own particular activation temperature or temperature range to which it must be heated to cause it to decompose, thereby liberating gas for foam production. For example, a simple internet search reveals that the activation/decomposition temperature of Celogen OT (p,p'-oxybis(benzenesulfonyl-hydrazide) is 153° C to 167° C, while the activation/decomposition temperature of Celogen TSH (p-toluenesulfonylhydrazide) is about 121° C.

In accordance with this invention, it has been found that these blowing agents can also be activated **at temperatures significantly below their traditional activation/decomposition temperatures** by contact with a certain type of epoxy resin curing agent as now expressly recited in claim 1, in particular a waterborne epoxy adduct of a polyamine, a polyamide or a polyamide-amine. In accordance with this invention, therefore, polymer foams can be formed with these sulfonyl hydrazides at temperatures which are significantly lower than thought possible in the past, for example at temperatures below the activation/decomposition temperature

of the blowing agent as specified in claim 1, at temperatures below about 60° C as specified in claim 25, and at ambient temperatures as specified in claims 37 and 53.

The Prior Art Rejections

Nothing like this is remotely suggested in any prior art reference.

For example, three of the four cited references which disclose these sulfonyl hydrazide blowing agents clearly indicate that, if such blowing agents are used, the resultant compositions must be heated to elevated temperatures to achieve foam formation. *See*, for example, col. 5, line 19 and col. 6, lines 6-8 of Wycech '486 (U.S. 5,758,486), col. 5, line 9 of Wycech '424 (U.S. 6,068,424), and Paragraph [0019], line 4, of Taylor '389 (U.S. 2002/0013389). Hence, these references clearly fail to suggest activating these sulfonyl hydrazides blowing agents at temperatures below their decomposition temperatures, as expressly recited in claim 1.

The remaining reference disclosing these sulfonyl hydrazide blowing agents, Czaplicki et al. (U.S. 2003/0069335), does indeed indicate that curing can be accomplished in some of its embodiments "without external heat," as noted by the examiner. *See*, Paragraph [0019]. However, these sulfonyl hydrazide blowing agents are optional ingredients. Moreover, there is no suggestion in this reference that these blowing agents would work if not heated to their activation temperatures. Therefore, it is unwarranted to assume that Czaplicki et al. fairly suggests including these sulfonyl hydrazide blowing agents in those of its composition made "without external heat," as the examiner is apparently doing here, because these sulfonyl hydrazide blowing agents would be expected not work in such embodiments.

As indicated above, conventional wisdom holds that sulfonyl hydrazide blowing agents must be heated to their activation temperatures to be effective. Because nothing in Czaplicki et al. suggests the contrary, this reference also fails to suggest that these sulfonyl hydrazides blowing agents can be activated at temperatures below their decomposition temperatures, as expressly recited in claim 1.

The remaining references cited by the examiner fail to remedy the defects of Wycech '486, Wycech '424, Taylor '389 and Czaplicki et al. For example, the Wycech '545 patent (U.S. 4,995,545), which has been cited for its disclosure of waterborne epoxy adduct curing agents of the type used in this invention, requires that its compositions be heated for activating

its foaming agents. *See*, col. 6, line 58. In addition, the foaming agents used in this reference are encapsulated inside microbeads where they would be prevented from coming into contact with this curing agent. Accordingly, this reference clearly fails to suggest that sulfonyl hydrazide blowing agents could be activated at temperatures below their activation temperatures, as expressly recited in claim 1, by contact with the particular type of curing agent specified in this claim, as applicant found.

In the other reference cited by the examiner for its disclosure of waterborne epoxy adduct curing agents of the type used in this invention, Starnier et al. (U.S. 7,282,543), no blowing agents are used at all. Accordingly, this reference clearly fails to suggest that sulfonyl hydrazide blowing agents could be activated at temperatures below their decomposition temperatures, as expressly recited in claim 1, by contact with these waterborne epoxy adduct curing agents, as applicant found.

The final reference relied on by the examiner, Carpenter, "Polysulfides (Use as Modifiers in Epoxy Systems)," has been cited merely for its disclosure of certain polysulfide/epoxy systems. It clearly does not suggest that that sulfonyl hydrazide blowing agents could be activated at temperatures far less than thought necessary in the past by contact with certain curing agents as specified in claim 1.

Applicant's discovery that certain sulfonyl hydrazide blowing agents can be activated at temperatures substantially lower than their known activation/decomposition temperatures is directly contrary to conventional wisdom and truly unexpected. Accordingly, applicant's invention, as a whole, is unobvious and patentable. *See*, MPEP §716.02 and especially *In re Papesch*, 50 CCPA 1084, 315 F.2d 381, 137 USPQ 43 (1963) and *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999) (citing *Graham v. Deere*, 383 U.S. 1, 17-18 (1966)).

The Restriction Requirement

In view of the above comments and claim amendments, applicant respectfully requests the examiner to reconsider and withdraw the outstanding restriction and election of species requirements.

From the above comments, it can be seen that a common feature running through all claims in this case is that certain sulfonyl hydrazide blowing agents are used, or are compounded

for use, in such a way that they decompose for foaming at temperatures significantly lower than their "traditional" activation/decomposition temperatures. This is directly contrary to conventional wisdom and makes each and every one of these claims novel, unobvious and patentable for the same reason.

Since the underlying reason for this restriction/election requirement (that there is no common inventive feature among all the claims) no longer applies, applicant respectfully submits that the requirement for this restriction/election requirement is no longer proper and hence should be withdrawn.

If any fee is due with this amendment, please charge our deposit account no. 03-0172.

Respectfully submitted,

/JEMiller/

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